BUSCH

OPERATING AND MAINTENANCE MANUAL

SECO PUMPS

SV1100, SV1140, SV1250

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INTRODUCTION

This Operating and Maintenance Manual covers the SV1100, SV1140 and SV1250 Series, single age, rotary dry vane Seco pumps. The Busch Seco is an oil-free vacuum pump (see Fig. 1).

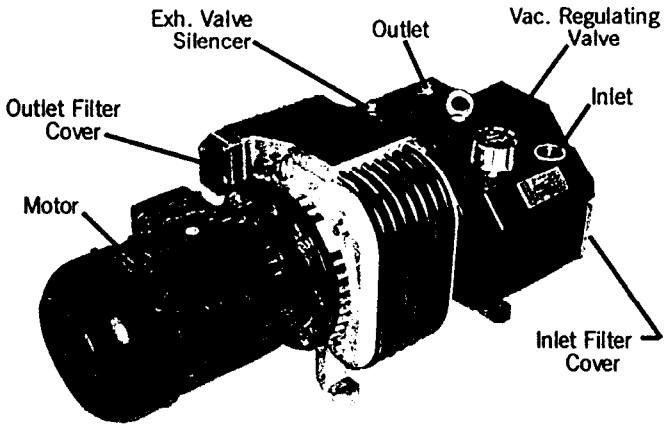


Fig. 1 - Seco SV1100 Pump

1.0 INSTALLATION

1.1 Unpacking

Inspect the box and pump carefully for any signs of damage incurred in transit. Since all pumps are ordinarily shipped F.O.B. our factory, such damage is the normal responsibility of the carrier and should be reported to them.

The inlet port of the pump is covered with a plastic cap prior to shipment to prevent dirt and other foreign material from entering the pump. Do not remove this cover until the pump is actually ready for connection to your system.

1.2 Location

Allow at least one foot of air space between the pump and any walls or other obstructions to the flow of cooling air.

Also, adequate ventilation must be provided to the fan of the motor (i.e., do not locate the pump in a stagnant ambient air location).

Choose a cool location with clean air that is free of dust and corrosive vapor. Locate the pump as close as possible to the point of use, preventing unnecessary pressure losses due to supply line length.

If installed in an enclosure, be sure to provide adequate ventilation to prevent overheating. Contact the factory for assistance.

1.3 Power Requirements

ALL ELECTRICAL CONNECTIONS SHOULD BE MADE BY A QUALIFIED, COMPETENT ELECTRICIAN IN ACCORDANCE WITH ALL LOCAL AND NATIONAL CODES!

The motor must be connected according to the electrical codes through a fused switch in order to protect the motor against electrical or mechanical overloads. The motor starter has to be set consistent with the motor current listed on the motor nameplate. If the pump is supplied with a manual motor starter, it is preset at the factory in accordance with the customer's specification. The typical electrical connections are shown in Fig. 2. For other voltage requirements, contact the factory for motor and/or starter information.

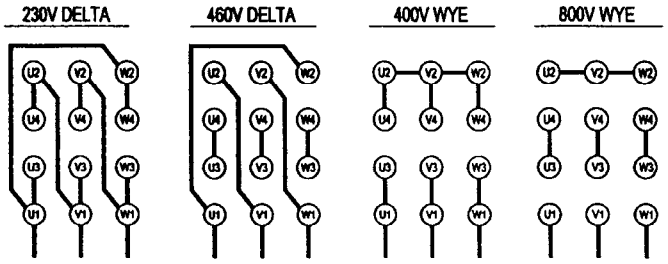


Fig. 2 - 3 Phase Katt Motor Connections

Correct direction of rotation is marked by an arrow on the housing and is clockwise when looking at the motor from the motor's fan side.

Caution: After electrical connection has been made, the rotation of the motor must be checked.

Observe the motor fan and jog the motor briefly to make sure it is rotating clockwise. If the motor is rotating backwards, correct as follows:

using the following procedures:

(a) Remove the end cover (Ref. 50/73) and bearing cover (Ref. 42/17) by removing the end cover screws (Ref. 51/87) and the bearing cover screws (Ref. 43/35). Remove the center screw (Ref. 50) on the SV1250.

(b) The bearing (Ref. 21/15) and the opposite motor side endplate (Ref. 40/5) are removed by removing the mounting screws (Ref. 9/34) and screwing two of the mounting screws into the threaded jacking holes, forcing the endplate and bearing off the shaft. Remove the two mounting screws used to force the endplate off the shaft and set the endplate and screws aside (see Fig. 4).

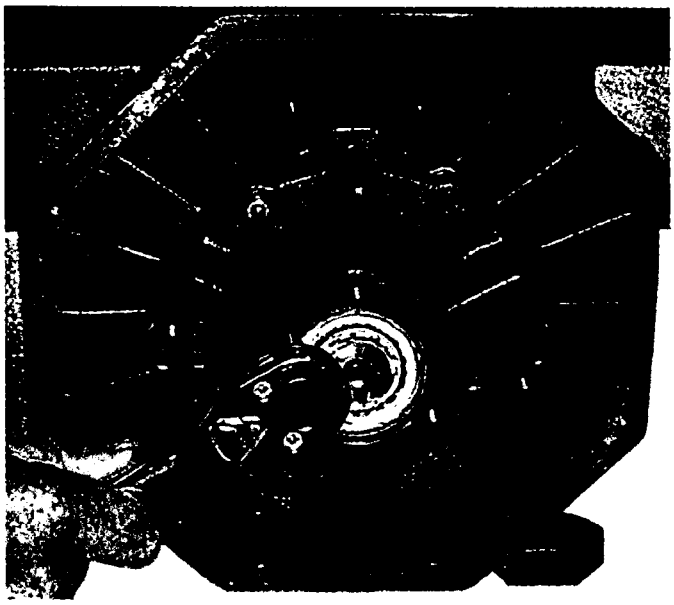


Fig. 4 - Opp. Motor Side End Plate Removal

(c) Inspect each vane one at a time by sliding the vane out of the vane slot. Note how it was situated in the slot so it can be returned to the same position. Use a set of Vernier calipers to measure the width and thickness of the vane (see Fig. 5). When the measurement is less than that indicated in the clearances table (see Fig. 15) of this manual, replace the vanes. Replace the vanes if cracks, chips or signs of excessive cupping or wear is evident.

(d) Reinstall the vanes and mount the end plate by using the mounting screws to push the bearing and endplate on the shaft.

(e) Refill the bearing grease cavity about 1/3 full and reinstall the bearing cover and housing end cover.

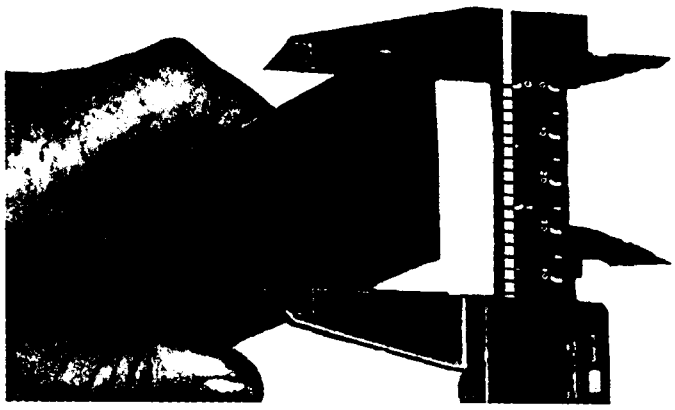


Fig. 5 - Measuring Vane Wear

4.3 Tools

To completely disassemble/assemble the Seco pumps, the following tools are recommended:

Allen wrenches
Bearing installation tool
Socket end wrenches
Soft hammer
Gear puller
Anti-Seize Compound
Loctite 242
Feeler gauge .04,.08, .10, 12 mm
Emery cloth
Flat honing stone
Tube of HyLomar®
Wooden blocks & rags
NLGI, Grade 2 Lithium Polymer Grease

4.4 Disassembly

The Seco SV1100, SV1140 and SV1250 pumps are easily dismantled and reassembled. Certain steps are recommended to be followed in the sequence outlined. Reasonable caution must be exercised to prevent damage to the parts during the operation and to insure proper pump performance after the repair.

4.4.1 Fan Intake Cover (Ref. 50/73)

Remove the socket head cap screws (Ref. 51/87), retaining the fan intake cover, then pull off the cover.

4.4.2 Rear Bearing Cover (Ref. 42/17)

Remove the socket head cap screws (Ref. 43/35) sed to mount the rear bearing cover. The bearing cover center screw (Ref. 50) must also be removed from the bearing cover on the SV1250. Set the cover and screws aside.

4.4.3 Endplate, Opposite Motor Side (Ref. 40/5)

(a) Remove the socket head cap screws (Ref. 9/34) retaining the endplate opposite the motor side. Thread two of the endplate cap screws into the endplate threaded holes (see Fig. 6).

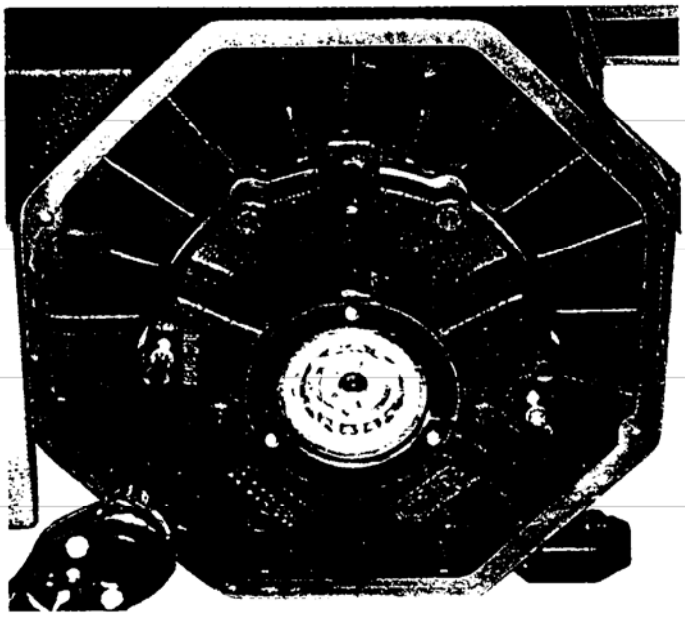


Fig. 6 - Opp. Motor Side Endplate Removal

Advance the two screws evenly, forcing the endplate away from the cylinder until it clears the dowel pins (Ref. 8/27) and can be set aside. If the O-ring (Ref. 41/4) is damaged or cracked, it will have to be replaced.

(b) Pull the bearing (Ref. 21/15) from the bearing cover. The retaining ring (Ref. 13), bearing cover B (Ref. 14), and the bearing spacer (Ref. 16) on the SV1250 must also be removed during the bearing removal process. Inspect the bearing (Ref. 21/15) for unusual wear or damage.

4.4.4 Vanes (Ref. 35)

Pull the vanes (Ref. 35/3) from the rotor (Ref. 20/2). At this point, examine the rotor and cylinder (Ref. 30/1) by looking into the end of the cylinder, checking for scoring or other apparent damage, to determine the extent of the repair and if it is more economical to replace or repair.

4.4.5 Motor (Ref. 130/81)

Remove the socket head cap screws holding the motor flange (Ref. 115/79). The motor and flange are removed as an assembly (see Fig. 7). Disassemble the motor/pump coupling as necessary to facilitate separating the motor from the rest of the pump assembly. Work the motor and shield off the assembly.

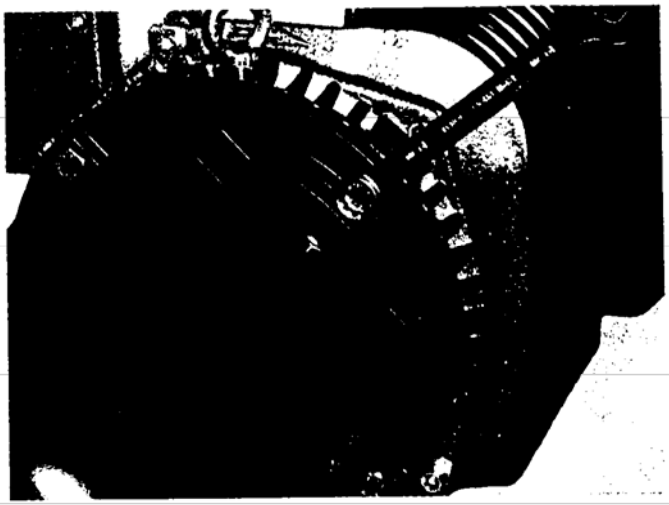


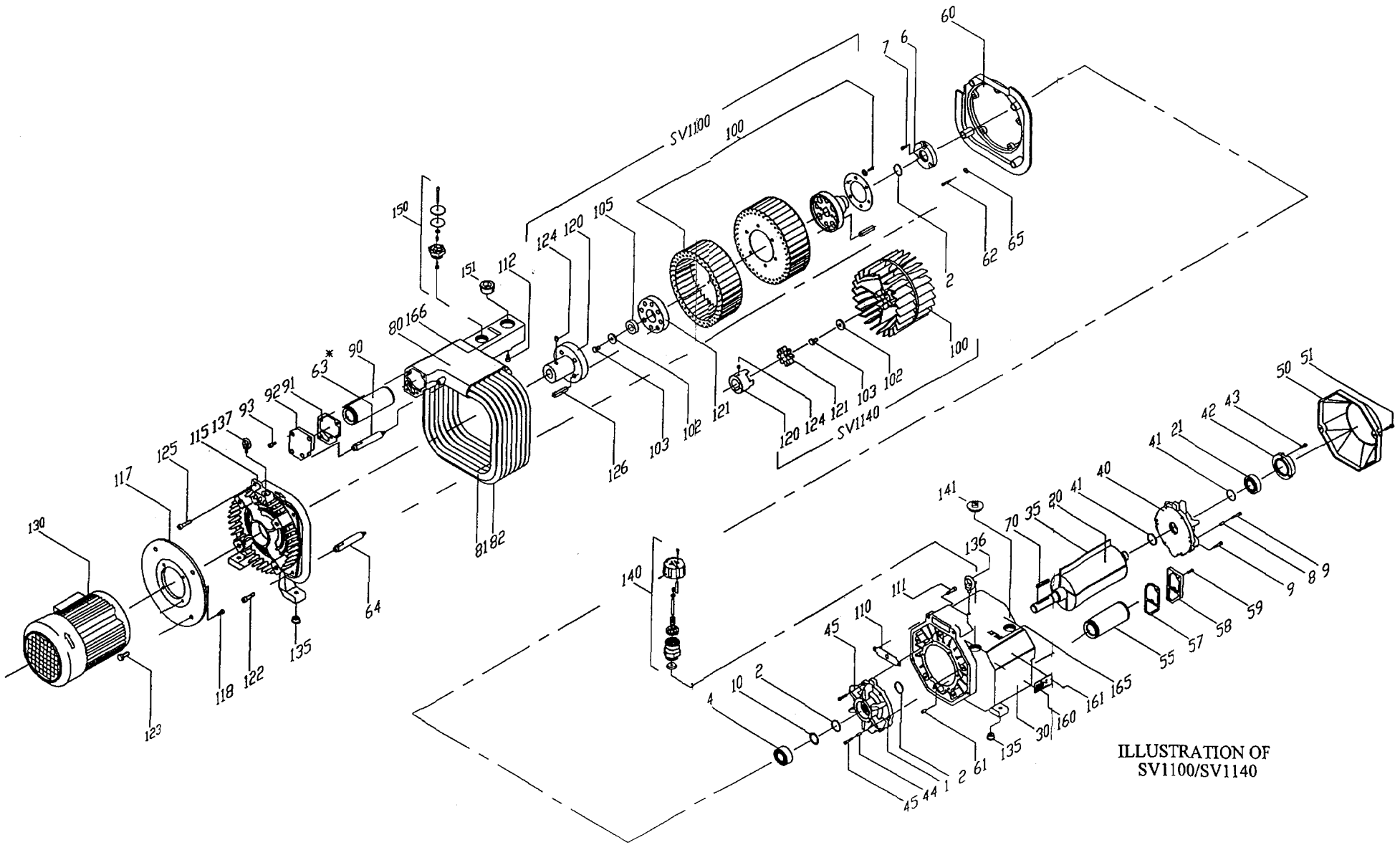
Fig. 7 - Motor and Flange Assembly

Note: When the motor and flange assembly is removed from the SV1100/1140, the pump will be resting on the cooling tubes. Place a rag and block under the tubes to prevent them from being damaged.

4.4.6 Fan Wheel (Ref. 100/67)

(a) On the SV1100/1140, use a rag or glove to protect your hand, then hold the fan and back out the socket head cap screw (Ref. 103) in the center of the shaft rotor shaft.

(b) Mount a puller to the threaded holes in the fan half of the motor coupling (Ref. 121 on the SV1100, Ref. 100 on the SV1140, Ref. 68 on the SV1250). Advance the center bolt until it pushes against the rotor shaft and forces the fan off the shaft (see Fig. 8). After pulling the fan, remove the shaft key (Ref. 70/19).


SV1100
100
SV1140
ILLUSTRATION OF
SV1100/SV1140

SV1100/SV1140 Parts List

Ref.	Description	Quantity 1100	Quantity 1140
1	Motor side endplate	1	1
2	O-ring	1	1
4	Ball bearing	1	1
6	Motor side bearing cover	1	1
7	Bearing cover screw, M6x16	3	3
8	Spring type straight pin, M8x20	2	2
9	Cylinder cover screw, M6x30	6	6
10	Bearing spacer	**	**
20	Rotor	1	1
21	Cylindrical roller bearing	1	1
30	Cylinder	1	1
35	Vane	4	4
40	Opposite motor side endplate	1	1
41	O-ring	1	1
42	Opposite motor side bearing cover	1	1
43	Cylinder bearing screw, M6x12 (16)	3	3
44	Spring-type straight pin, 8x20	2	2
45	Cylinder cover screw, M6x30	6	6
50	Cover	1	1
51	Cylinder cover screw, M6x25	2	2
55	Inlet filter cartridge	1	1
57	Seal	1	1
58	Inlet filter cover	1	1
59	Cylinder cover screw, M6x20 (16)	2	2
60	Intermediate plate	1	1
61	Spring type straight pin, M10x16	2	2
62	Cylinder cover screw, M6x30	5	5
63	Distance pin	-	1
64	Distance pin	4	3
65	Washer	5	5
70	Shaft key	1	1
80	Cooler housing	1	1
81	Cooling tube, d14 x1x758 (860)	7	7
82	Cooling tube, d14 x1x826 (940)	7	7
90	Outlet filter cartridge	1	1
91	Seal	1	1
92	Outlet filter cover	1	1
93	Outlet filter cover screw, 4x20 (6x10)	4	4
100	Radial fan	1	1
102	Washer	1	1
103	Hexagon head screw, M10x25 (20)	1	1
105	Spacer	1	-
110	Seal	1	1
111	Cylinder cover screw, M8x30	2	2
112	Cylinder cover screw, M8x20 (16)	2	2
115	Motor/pump flange	1	1
117	Adapter flange	-	1
118	Adapter flange screw	-	4
120	Motor side coupling half	1	1
121	Coupling insert	1	1
122	Motor flange screw, M10x40 (50)	3	4
123	Hexagon head screw, M12x35	4	4
124	Socket set screw, M8x8	1	1
125	Cylinder cover screw	1	1
126	Coupling pin	4	4
130*	Motor	1	1
130.1*	Terminal board	1	1
130.2*	Terminal box	1	1
130.3*	Fan blade	1	1
130.4*	Motor fan cover	1	1
135	Stand	1	1
136	Eye bolt, M10	1	1
137	Eye bolt, M8	1	1
140	Vacuum regulating valve	1	1
141	Plug, G 1-1/4	1	1
150	Silencer valve	1	1
151	Plug, G 1-1/4A	1	1
160	Nameplate	1	1
165	Sign "Inlet"	1	1
166	Sign "Outlet"	1	1

*When ordering, please state motor data and serial number of pump.

**Customer must determine the number of spacers required during disassembly/reassembly. It is recommended that several be ordered, since they can easily be damaged during maintenance.

Sizes of screws, pins, etc., are given in millimeters and are the same for both pump sizes except where noted by ( )'s. Numbers in ( )'s are for the SV1140 pump.

SV1250 Parts List

Ref.	Description	Quantity
	Cylinder	1
2	Rotor	1
3	Vane	4
4	O-ring	2
5	Cylinder endplate	2
6	Cooler housing	1
7	Motor side bearing cover	1
8	Motor side bearing	1
9	Spanner nut	1
10	INA-seal ring	1
11	Bearing cover A	1
12	Retaining ring	1
13	Retaining ring	1
14	Bearing cover B	1
15	Roller bearing	1
16	Bearing spacer	1
17	Opposite motor side bearing cover	1
18	Grease nipple	1
19	Key	1
20	Plug	1
21	Disc	1
22	Pipe	1
23	Hollow screw	1
	Seal ring	2
25	Hollow screw	1
26	Seal ring	2
27	Dowel pin	2
28	Valve	1
29	Exhaust valve disc	1
30	Exhaust valve plate	1
31	Eye bolt	1
32	Seal ring	1
33	Support ring	1
34	Cylinder cover screws	16
35	Opposite motor side bearing cover screw	4
36	Gasket	2
37	Inlet filter housing	1
38	Shaft screw	2
39	Inlet filter base gasket	1
40	Inlet filter base	1
41	Inlet filter seal ring	6
42	Inlet filter cartridge	6
43	Screw	6
44	Inlet filter cover gasket	1
45	Inlet filter cover	1
46	Conical spring	?
47	Inlet filter cover knob	8
3	Inlet filter housing plug	1
49	Sealing ring	1
50	Bearing cover center screw	1
51	Exhaust filter frame	1
52	Gasket	1
53	Exhaust box	1
54	Exhaust box valve gasket	1
55	Exhaust valve assembly	1
56	Allen screw	2
57	Spring plate	2
58	Exhaust valve spring	2
59	Exhaust valve plate	2
60	Pipe	2
61	Exhaust valve disc	2
62	Exhaust valve disc	2
63	Exhaust valve plate	1
64	Elbow	1
65	Silencer	1
66	Fan cover	1
67	Fan	1
68	Pump side coupling half	1
69	Coupling bolt	1
70	Distance ring	1
71	Rubber coupling	1
72	Security ring	1
73	End cover	1
74	Washer	4
75	Motor side bearing cover screw	4
76	Nut	2
77	Screw	2
78	Motor side coupling half	1
79	Motor flange	1
80	Foot	1
81	Motor	1
82	Set screw	1
83	Rubber foot	2
84	Washer	2
85	Screw	2
86	Screw	2
87	End cover screw	4
88	Exhaust valve plate screw	1
89	Exhaust filter frame screw	8
90	Motor flange screw	8
91	Cooler housing screw	4
92	Exhaust cover screw	8
93	Exhaust box screw	2
94	Washer	2
95	Washer	6
96	Nut	6
100	Data plate	1
101	Greasing label	1
102	Rotation arrow	1

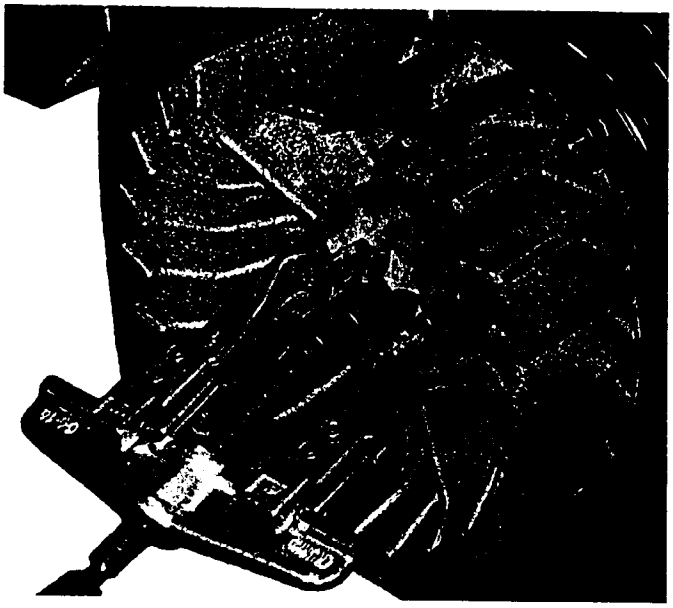


Fig. 8 - Pulling the Pump Cooling Fan

4.4.7 Motor Side Bearing Cover Plate (Ref.6/11)

Remove the socket head cap screws (Ref. 7/75), retaining the motor side bearing cover plate. On the SV1250, the greasing assembly must be removed also. Pull the cover plate off the assembly.

4.4.8 Endplate, Motor Side (Ref. 1/5)

Remove the socket head cap screws (Ref. 45/34), retaining the endplate motor side. Thread two of the endplate cap screws into the endplate threaded holes. Advance the two screws evenly, forcing the endplate away from the cylinder. You must clear the dowel pins (Ref. 61) on the SV1100/1140. Pull the endplate and rotor out of the cylinder (see Fig. 9). Inspect the cylinder for and rotor for damage.

Note: It may not be necessary to remove the cooling coil assembly from the cylinder on the SV1100/1140.

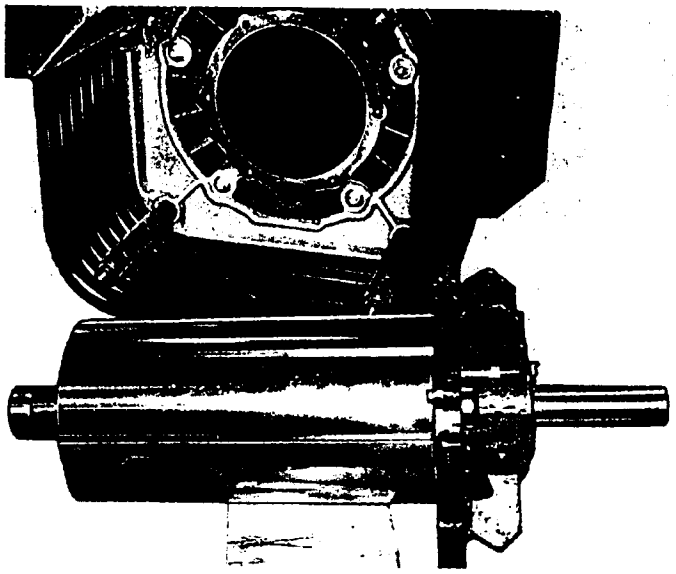


Fig. 9 - Pulling the Endplate and Rotor

4.4.9 Rotor (Ref. 20/2)

(a) Set the end of the rotor on two blocks of wood with the shaft extending down between them (see Fig. 10).

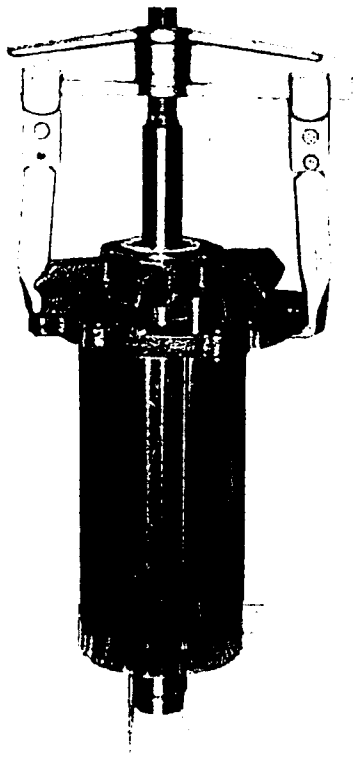


Fig. 10 - Pulling the Endplate from the Rotor

(b) Install a jaw-type puller to pull the endplate off the shaft. Use a washer between the jaws of the puller and the sealing surface of the end-

plate to prevent damage to the sealing surface. Advance the puller until the endplate is free of the shaft.

.e: Under the bearing on the SV1100/ 1140 is a spacer (Ref.10) and an O-ring (Ref. 2). Do not damage or misplace this spacer as it has been selected to give the correct rotor to cylinder axial clearance. Under the bearing on the SV1250 is a seal ring (Ref. 32) and a support ring (Ref. 33). Set these aside for reuse during reassembly.

4.5 Cleaning and Inspection

4.5.1 General

(a) Soak the parts in a degreasing solution, agitate and scrub to remove any grimy residue, then rinse and blow dry with clean, dry, compressed air.

(b) Inspect the sealing surfaces. Use a honing stone to polish out nicks and scratches.

(c) Use a cleaning solvent to remove any joint npound.

(d) Inspect the motor coupling for wear or deterioration.

4.5.2 Rotor

Place the rotor in a set of v-blocks or lathe, and check for shaft alignment (runout).

4.5.3 Endplates

Inspect the shaft seals (Ref. 2/32) and replace them if they are damaged.

4.5.4 Cooler Housing (80/6)

Inspect the cooling housing for damage. Inspect the cooling tube joints (Ref. 81 and 82) on the SV1100/1140. Reseal any leaking joints with a joint compound such as HyLomar® available by ordering from Busch, Inc.

4.6 Assembly

4.6.1 Axial Clearance

If the rotor, endplate, or bearing is replaced, it will be necessary to reestablish the bearing spacer thickness. It can be determined as follows on the SV1100/1140:

Tap the bearing (Ref. 4) into the endplate bearing cavity by using a hammer and a bearing installation tool (see Fig. 11). Make sure it has bottomed in the cavity. Do not use a bearing spacer.

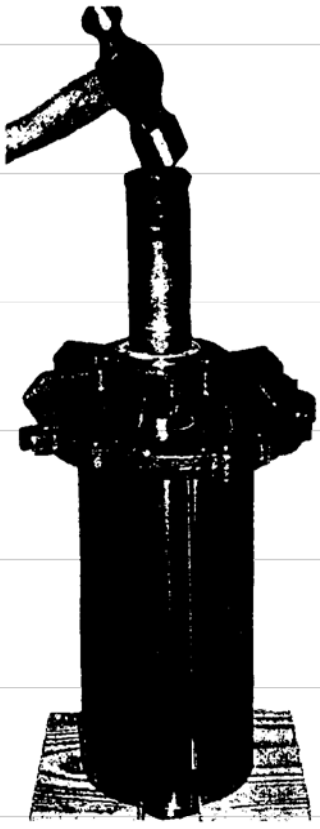


Fig. 11 - Bearing Installation

Note: Bearing installation tool - use a piece of pipe with an inside diameter slightly larger than the outside diameter of the rotor shaft. When slid down over the shaft, the pipe will rest solely on the inside race of the bearing.

Slide the endplate (Ref.1/5) down over the rotor shaft. Use a hammer and bearing installation tool to tap it down until the bearing bottoms on a step in the shaft. Make sure the bearing is at the bottom of the cavity and resting on the step in the shaft. Use a feeler gauge to measure the

Clearances										
	Cylinder		Vane			Rotor		Axial		Radial
Model	Length	Dia.	Length	Thick.	Width	Length	Dia.	Motor Side	Opp. Motor	
SV1100	$250^{+0}_{-0.029}$	– – –	$249.5^{+0}_{-0.029}$	$3.85^{+0.05}_{-0}$	26	$249.54^{+0}_{-.029}$	– – –	0.04 - 0.08	0.35 - 0.39	0.08 - 0.14
SV1140	$240^{+0}_{-0.029}$	– – –	$249.5^{+0}_{-0.029}$	$3.85^{+0.05}_{-0}$	30	$239.54^{+0}_{-.029}$	– – –	0.04 - 0.08	0.35 - 0.39	0.08 - 0.14
SV1250	$320.9^{+0.01}_{-0.01}$	$170^{+0}_{-0.01}$	$320.3^{+0.05}_{-0.05}$	$6^{+0.05}_{-0}$	40	$320^{+0.01}_{-0.01}$	$149^{+0}_{-0.02}$	0.10	0.78 - 0.82	0.18

Note: All dimensions are in millimeters.

Technical Data						
Model	Nom. Displacement @60Hz (ACFM)	Ult. Pressure Torr(abs)	Nom. Motor Rating @60Hz (kw)	Nom. Motor Speed @60Hz (min^{-1})	Sound Level (DIN 45635) dB(A)	Weight (kg)
SV1100	70.6	75	4	1800	76	122
SV1140	98.9	75	5.5	1800	77	138
SV1250	176.5	75	9	1800	82	228

Fig. 15 - Clearances and Technical Data